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Automated audio visual vocational training courses for duplication machine operator and janitor occupations were developed for poor learners to use in rehabilitation centers, state hospitals, etc. Program development included: (1) surveying pertinent literature in the field of program learning of occupations, (2) visiting business and industrial concerns to determine trainee responsibilities, (3) training curriculum development personnel, (4) preparing, testing and revising subject matter, (5) selecting a presentation system, (6) integrating the content and presentation system, and (7) monitoring trainee performance in the completed program. The teaching system used programmed question and response booklets, tape recordings, color slides, structured practice, and human supervision. It was concluded that the programs imparted the necessary skills to poor learners, and could be effectively used in non-educational settings. Individualized vocational training for poor learners has some distinct advantages, and the techniques can be used with similar job training programs for other occupations. The development and reproduction of the programs proved to be time-consuming, difficult and costly. (FP)

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FINAL REPORT

Project No. ERD-426
Grant No. OE-6-85-088

THE DEVELOPMENT OF SPECIALIZED EDUCATIONAL PROGRAMS FOR POOR LEARNERS FOR USE IN NON-EDUCATIONAL SETTINGS

December 1968

Prepared for

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Richard G. Sandhofer,
Principal Investigator

Jack L. Nichols, Ed.
Editor

December 1968

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Richard G. Sandhofer

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The Introduction to the Metal Stamping Industry Training Program

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INTRODUCTION

The Problem

In recent years it has become increasingly evident that members of our society with severe socio-economic, cultural, psychological, and educational deficiencies are unable to make effective use of existing educational programs. This group is comprised of persons who frequently do not enter educational programs and, if they do enter, often fail to complete them. With these individuals, the learning problems may stem from maladaptive attitudes, lack of interest and motivation, as well as limited basic skills and reduced intellectual efficiency.

Such persons find it difficult to use existing educational programs for a variety of reasons. First, few job training programs are appropriate for the poor learner because most of the programs involve preparation for higher level occupations which require a complex curriculum. Secondly, because of the difficulty level of the courses, the method of selecting trainees is rather rigorous. Thus, many persons with less native capacity are eliminated through the use of psychometric instruments and other selection devices. Thirdly, many persons who do enter these training programs fail to complete them because the teaching is done in groups using traditional classroom techniques which make it difficult to provide the individual instruction needed by poor learners. Fourthly, the lack of motivation so peculiar to this population poses particular difficulties for the instructors who find it difficult to cope with those trainees who need concurrent psychological, social, and vocational services to facilitate training.

The Project Purpose

The purpose of this project was to develop unique educational programs which could be used to enhance job skills for trainees served in non educational settings. Each year these non-educational settings serve hundreds of thousands of individuals.

A partial list of such settings includes rehabilitation centers, sheltered workshops, state institutions for the mentally ill and mentally retarded, veterans administration hospitals and state and federal correctional institutions. The skill training programs developed in this project were intended to add a unique dimension to these non-educational settings.

Instructional programs were to be developed for three prototype occupations: Janitor (DOT 2-84.10), Duplicating Machine Operator (DOT 1-25.22), and Punch Press Operator (DOT 6-88.62). Because of time limitations, permission was obtained after the project began to cancel the development of a fourth occupation training program for hospital orderlies.

These three prototype occupations were chosen because:

1. Although these occupations do not require formal training, the possibility of obtaining employment in these occupations is usually enhanced if the person has had prior training or related work experience.

2. The three occupations are found in most labor market areas of the United States.

3. It is difficult to find educational programs for these occupations other than employer training programs.

4. Each of the three occupations represents a different vocational area (service, clerical, and manual repetitive).

The teaching materials developed for these programs were to be of such a nature that they could be provided on an individual rather than a class basis since this instructional style would best fit within the staffing capabilities of non-educational settings. The programs developed would have to be constructed so as to stimulate the learner, reward the acquisition of knowledge, and be sensitive to the unique learning problems of the poor learner. In addition, the programs were to use such materials as programmed texts, teaching machines, tape recordings, slides and other equipment, all to be integrated into a multi-media delivery system.

METHODOLOGY

This section will document the procedures used in the development of the three programs. There were similar steps used in the development of each of the three individual programs. These steps will be described in Part A, General Steps in Program Development. There were also, of course, certain variations within these steps which were unique to each of the programs. These will be described in Part B, Uniquenesses in Methodology.

Part A. General Steps in Program Development

It will become obvious that activities in several of the following steps took place simultaneously. The steps are presented as being rather discrete for the sake of clarity only.

Step 1. Survey the Literature

At the outset of the project, a survey was made of the pertinent literature in the field of programmed learning. This survey was made for two reasons: (1) To insure that the programs we were to develop would provide a unique contribution to the field and would not simply be duplicating the efforts of others, and (2) To determine if specific principles existed which could be used to guide us in the development of each of the programs.

As a result of our survey, it was found that there were no other programmed courses which had been developed which accomplished what we were setting out to do. We were thus reasonably confident that we would not be duplicating the efforts of others. The survey of the literature also revealed that certain programming principles do exist. These principles, however, were of a very general nature. For example, one such principle is that materials must be subdivided for presenting them to the trainee. The principle, of course, does not enable the program developer to determine how much subdivision is necessary as a variety of variables must be considered, for example, the reading level of the trainees. If the material is subdivided too much, continuity is lost, the material becomes confusing and the trainee becomes bored. If the material is not sufficiently subdivided, a trainee may not understand the material being presented to him.

Thus the programming principles which exist were found to be so general in nature that they provided only the broadest of guidelines. The result was that the development of the programs required considerable trial and error experimentation.

Step 2. Determine Job Performance Requirements in Industry.

This step involved going to business and industrial concerns which employ persons in the jobs which we were to program and observing the performance of the workers on the jobs.

The perspective in this step was partly one of determining what elements or operations of the job to exclude from the program in addition to what to include. In general the operations which were excluded were:

(1) Those aspects of a job which were unique to a particular company.

(2) Those aspects of a job which could best be learned in the actual work setting. Conventional on-the-job training is a more efficient, effective teaching technique than providing a programmed course if, for example, it takes but a few minutes to learn the operation

Step 3. Learn the Occupations.

In step 2, we learned what the trainee had to do in the work setting, for example, most janitors must operate a floor buffing machine. In step 3, it was necessary to learn how they do it, for example, how a floor buffing machine is operated. It was found that the best way to do this was for the person who would be programming the particular course to become as proficient in the job as possible. The program developer, because he was learning the particular job for the first time, was in an excellent position to recognize the steps in learning the job. He was also less likely to take important considerations for granted such as the repertoire of experiences which are to be built upon in learning the job.

At the end of this step, we knew what was typically required of workers in each of the three occupations and what the workers had to do to meet those performance requirements.

Step 4. Prepare a Tentative Program.

We were next faced with the task of putting what we had found into the form of a tentative program. This was especially difficult as our search of the literature had revealed that there were no established guidelines for us to follow since we were developing a new job-training course for a unique population. If we had taken an already developed program for a job and were re-programming it for use in a slightly different industry, we would have had some guidelines as many of the responses necessarily would be similar. Since this was not the case, a considerable amount of time was taken in this step in trial and error experimentation.

Step 5. Try Out and Revise the Tentative Program.

The objective of this step was to determine if, on a very general level, we were proceeding in the appropriate direction in preparing the programs. We wanted to know, for example, if the instructions to the trainees for performing certain tasks were simple enough to be understood, yet not so simple that the trainees would become bored.

In order to accomplish this objective, instructions for specific units of each program were presented to several trainees and their subsequent performance was observed. Extensive revisions were made in the tentative programs as a result.

Step 6. Select the Presentation Equipment.

At this point presentation equipment had to be selected. Before the search for a machine could actually begin, however, it was necessary to define the selection criteria which would have to be met by the teaching machine. These criteria were as follows:

A. The overriding consideration was that the machine would have to enable us to avoid using lengthy verbal descriptions by offering a pictorial means of presentation. For example, in the Duplicating Machine Operator Program, we knew that the trainees would have to learn the name, appearance, and location of the parts of the duplicator which they would have to handle. Expecting poor learners to master this kind of information by verbal description alone was clearly out of the question.

B. The hardware would have to have the capacity to hold the large number of pictures which would be needed in each of the programs.

C. The hardware would have to be reasonably priced (defined as less than $1,000).

D. The hardware would have to have proven reliability (defined as a low frequency-of-repair record).

E. The hardware would have to be simple to operate.

F. The hardware would have to be relatively tamper proof by trainees. For example, the trainees should not be able to erase material from the machine or jam the machine.

G. In the event of a breakdown of the hardware, servicing must be available.

H. The machine must have flexibility. For example, the machine must permit both fill-in-the-blank and multiple-choice responses.

After an extensive study of the teaching machines presently available, we concluded that none met all of these selection criteria. Typically, either the machines available did not have sufficient capacity to hold the large number of pictures or the cost was prohibitive.

Since no teaching machine met all of the criteria, a search was made for a presentation system which would most closely approximate the criteria. As a result, it was decided that the hardware for the programs would be a slide projector synchronized to a tape recorder. These two pieces of equipment would be used to present the material. A programmed text would be assembled in which a trainee could make the necessary responses. The text would also contain the correct answers so that the trainee could confirm his responses.

Step 7. Develop the Programmed Text

By the time we had reached this step of preparing the programmed texts, we knew what information the trainees would have to know in each of the programs. This information would be imparted to the trainees through the vehicle of the tape recorder, synchronized to the slide projector. Stated simply, the purpose of the programmed text was to insure that the trainees learned the required information. The three principles which we used in developing the programmed texts were: (1) Information must be presented in small amounts; (2) The person presented with the information must emit a behavior, for example, he must answer a question about

the material; (3) The accuracy of the behavior or response must be confirmed or, if inaccurate, must be corrected. In order to do this, the formats used in existing programmed texts were studied, a tentative format was decided upon for each of our three programs, the actual programmed texts were written and tried out with several clients.

Step 8. Prepare the Pictures Which Were to Be Presented.

Three alternatives were experimented with in the process of selecting the best method to pictorially present the necessary information to trainees.

A. An artist was selected to draw the illustrations which we felt would be needed in the program. This was found to be a very expensive technique for getting pictures into the program and had to be abandoned.

B. Movies were tried and found to present as many problems as they solved. Although film had the great advantage of showing movement, the hardware needed to do the filming, the cost of developing the film, and the cost of the services of a professional photographer combined to make movies too expensive an alternative.

C. Because they did not have the above problems, 35mm color slides were the choice for pictorially fulfilling the needs of the programs.

After taking the pictures these color slides were then developed, sorted, placed in slide trays, and labeled.

Step 9. Place the Written Material Developed as a Result of Step 5 on Tape Cartridges.

For each of the three programs, this step involved taking the final material which has been developed and reading it on to tape cartridges. A myriad of technical problems were encountered which had to be resolved. For example, how fast should one speak into the tape? How long should each slide be shown? What is the best audio setting to record at to maximize fidelity and reduce distortion? etc.

Step 10. Synchronize the Slides to the Tape Cartridges.

This step involved the process of placing the synchronization signals on the tape to control the changing of the slides in the projector.

Step 11. Try Out the Entire Program.

We were ready to study the effectiveness of the programs once the materials in each of the programs had been put together into a complete "package".

In order to test a program, several of the Minneapolis Rehabilitation Center's clients were trained using the program and their performances were observed. The characteristics of these clients and their performance as a result of the training programs will be presented in the Results section of this report.

Part B. Uniquenesses in Methodology

THE DUPLICATING MACHINE OPERATOR PROGRAM

Choosing the Duplicating Machine

After the general survey of the literature was completed, the next step was to determine what specific type and model of duplicating machine was to be used in the program. The job title, Duplicating Machine Operator, is one with a very broad scope. Depending on the particular company—and even the department within the company—where the trainee would secure his job, a duplicating machine operator might have to use a spirit duplicator or mimeograph machine or offset press or copying machine. Compounding the problem was the fact that for each of these types of machines, a variety of different models are manufactured each with somewhat different parts and operating procedures. It thus became evident that our training program would have to be built around one specific type and model of duplicating machine with the expectation that the trainees could transfer the principles of operating that particular model of duplicating machine to the operation of other types of duplicating machines.

In order for the program to have the greatest potential use, the following criteria were used in selecting the type and model of duplicating machine:

1. The duplicator selected would have to be widely used in industry.

2. The operation of the particular duplicating machine would have to be a full-time job.

3. There must be a reasonable balance between simplicity and complexity of operation. (If it takes only five minutes to learn the operation of the machine, then conventional on-the-job training would be a more efficient teaching method as it would not involve the expense of building a programmed course. On the other hand, the machine could not be so complex in its operation that it could not be programmed within a reasonable time.)

4. There must be a reasonable expectation that the particular duplicating machine selected would not be made obsolete by imminent developments in the duplicating field.

5. There should be direct access to operating the particular duplicating machine in most companies. (If a particular type of duplicating machine, for example, offset presses, are more widely used in union than non-union shops, then membership in the union rather than skill per se becomes the primary entrance requirement. Moreover, our building a training program under these circumstances could lead to difficulty with the unions.)

Our survey concluded that the duplicator which most closely met all of these selection criteria was the 1250 Multilith Offset Duplicator. This machine has been on the market since the mid 1930's, is the most widely

used model of its kind, is operated as a full-time job, is of a medium to high complexity to operate, is used widely in both union and non-union shops, the training for the occupation is not controlled by any printing union, and is not likely to become obsolete in the near future as competing quality printing processes are significantly more expensive and are likely to remain that way in the foreseeable future.

That the training program was developed using only one specific make and model of a duplicating machine does not constitute a substantial limitation to the program's utility. The general principles of operation for most offset duplicators are similar. Thus, there is a reasonable expectation that a trainee who mastered the operation of the 1250 Multilith would quickly learn to operate many other makes of offset-type duplicating machines.

In developing the Duplicating Machine Operator Program, the assumption was made that the combinations of muscular responses and visual discriminations which had to be shaped were not already in the response repertoire of the trainees. In other words, knowing when a lever had been tightened to sufficient tension was something which the trainee would have to learn--it was not previously known by the trainee.

In the Janitor program, on the other hand, most of the muscular responses were presumed to be already in the repertoire of the trainee, for example, the muscular responses necessary to wipe a sink were already possessed by the trainees and would not have to be shaped by the training program. What the Janitor program would have to do was to enable the trainee to achieve a cognitive understanding of the responses which were involved in the work of the janitor. With the cognitive understanding generated by the training program, the trainee was expected to later produce the desired behaviors <u>on the job</u>.

This difference in the nature of what the Duplicating Machine Operator Program had to accomplish affected the methodology used in developing the program. The effects were:

1. <u>The need to have the actual machine available for the trainee to practice on</u>. The trainees could not be expected to retain all the details of operation of the machine between the time when they were presented them in the program until they actually obtained a job working on a Multilith.

2. The trainees could also not be expected to retain the necessary information between the time of initial presentation and practice on the machine. Consequently, <u>a small manual had to be developed which the trainee could refer to as he practiced</u> on the machine.

3. <u>A set of slides were developed for the trainee to look at</u> to further assist him as he practiced on the machine. Each of these slides had a guide number visible in it which corresponded to a guide number in the small manual the trainee used.

4. Because of the distinct possibility that the trainee would encounter such unknowns as mechanical failures in the machine and in order to provide the trainee with the opportunity to receive confirmation

and correction of his responses with a "personal touch", provisions were made in the program for the trainee to periodically have access to an instructor or some other qualified operator.

With the exception of the above, the development of the Multilith program proceeded within the context of the general steps documented in Part A.

THE BASIC COURSE FOR THE METAL STAMPING INDUSTRY PROGRAM

The original intent in this program was to develop a training course for the job title, Punch Press Operator (D.O.T. 6-88.62). As a result of visiting industrial sites to determine the job performance requirements for punch press operators (Step 2 in General Steps in Program Development), a major change was made in our program objective.

The operation of a punch press was found to be a simple and basically manipulative skill which can be learned in a matter of minutes. Hence, the learning process is so simple that little employment advantage would accrue to a trainee who had completed the program.

A more advanced stage in punch press operation involves what is called "set-up work". Essentially, this means that the punch press operator makes adjustments on the punch press, inserts dies, sets guideblocks, etc. Set-up work was found to be a complicated process that is rarely attempted by operators who have not had considerable experience. More important, training a person to do set-up work is most effectively done in the work setting.

As a result, it was concluded that the objective of developing a training course to teach trainees how to operate a punch press should be abandoned. However, since the metal stamping industry is such a large employer of people, it was decided that a basic course to prepare trainees to enter the industry would not only be appropriate for our teaching system, but those skills which could be taught through the program would be highly useful to a trainee entering the industry. Moreover, the skills acquired by the trainees would not only prepare them for the metal stamping industry, but would have utility for other settings such as machine shops.

The newly adopted objectives for the program were:

a. To enable trainees to learn the operation of measuring tools, for example, the micrometer.

b. To enable trainees to identify metal fabricating machines such as the punch press, drill press, etc.

c. To enable trainees to learn the fundamental processes performed on metal by these machines, for example, blanking, forming, piercing, etc.

The reader's attention is called to the earlier distinction which was made between what the Duplicating Machine Operator Program had to do and what the Janitor Program had to do. The essential difference was that

the Janitor program was attempting to shape cognitive understanding with the assumption that the necessary simple muscular responses were already possessed by the trainees; whereas the Duplicating Machine Operator Program was attempting to shape cognitive understanding, visual discriminations, and new or unique complex muscular responses.

In contrast to both, in the Metal Stamping Industry Program, the muscular responses which were to be shaped were simple, but were not already possessed by the trainees. Thus, the program had to shape new, simple, muscular responses and develop cognitive understanding and visual discriminations. The effects on the development of the program were:

1. The need to have the actual equipment available for the trainee to practice with actual equipment, such as micrometers.

2. In order to provide the trainee with confirmation or correction of his responses, provision was periodically made in the program for the trainee to see his supervisor.

As a result of both time and cost limitations, activities in the development of this program had to be discontinued following the preparation of the programmed text. This is Step 7 in the developmental sequence described in Part A.

THE JANITOR PROGRAM

Certain conclusions were made as a result of visiting a variety of business and industrial settings to determine the job performance requirements for janitors.

Janitorial work is performed primarily on the basis of the particular beliefs held by the supervisors. Hence, operating routines and equipment used vary greatly from one company to another. It was found, however, that there was certain equipment commonly used and a basic core of tasks that most janitors are required to perform.

It was decided to construct the program by designing it around six commonly used pieces of power and hand equipment and teaching the trainees to use this equipment in five different operations. The equipment included: a floor buffing machine, vacuum cleaner, mop, bucket, broom, and dust mop.

This equipment was integrated into a work routine involving the following five operations:

1. Sweeping a stairs.
2. Dust mopping an area containing furniture placed in rows, for example, an auditorium, and an area containing various pieces of furniture, for example, a living room or conference room.
3. Spray waxing floors.
4. Cleaning lavatories.
5. Removing and replacing floor wax.

The remaining steps in the development of the Janitor Program were comparable to those described in Part A.

RESULTS

This section of the report will document the results of the project. The section is divided into three parts: (1) A description of each of the two training programs which were produced, (2) A documentation of the results of providing the two training programs to a group of the MRC's clients, and (3) A qualitative analysis of the two programs.

Part A. Description of the Programs

The Basic Delivery System Used in Both Programs

Equipment:

1. Projection Screen
2. Slide Projector - A Kodak Carrousel Auto-Focus (Model 850) was used.
3. Slide Trays - Kodak Carrousel Trays were used. (The model or type of tray used should have the capacity for at least 80 slides.)
4. Slides - 35mm colored slides were used.
5. Tape Recorder and Tape Cartridges - A Cousino Stereo Tape Recorder (Model SR-7341) was used. The tape cartridges used with this recorder never needs rewinding and thus requires a minimum of handling.
6. A Pencil
7. The Question and Response Booklet(s)

Integration of the Components:

On the first day, the trainee is seated at a desk in a small room. On the desk in front of the trainee is the tape recorder and cartridges, a slide projector, question and response booklet(s), a pencil, and the slide trays. At the front of the room is a projection screen.

An instructor or supervisor demonstrates how to hook up the equipment and activates the tape recorder and the slide projector. On the tape cartridge are instructions which explain to the trainee how he is to take the program. At the completion of the instructions, the tape recorder shuts off automatically. The instructor or supervisor then answers any questions the trainee may have concerning the instructions.

To begin the program, the trainee pushes a button at the end of a remote control cord leading from the tape recorder. This reactivates the tape recorder and the trainee hears the first training material in the program. As he hears this material, he simultaneously sees slides projected onto the screen at the front of the room. The slide changes are synchronized to the material on the tape cartridges by means of inaudible signals recorded on a separate track of the tape. At the completion of this first material, the recorder once again shuts off automatically. Following instructions on the tape, the trainee opens the question and response booklet in front of him and answers the first question in the booklet. He then turns over the page and checks his answer with the correct response.

Across the page from the correct response the material that was on the tape is repeated. Printed in the booklet are instructions to the trainee to reactivate the tape recorder. The instructor or supervisor remains with the trainee until the trainee understands the mechanics of the course and can be left to proceed on his own. Usually, answering the first four questions demonstrates the trainee's capacity to proceed on his own.

THE DUPLICATING MACHINE OPERATOR PROGRAM

Objectives and Sub-Objectives

The objective of the program is to enable an individual who is completely unfamiliar with the duplicator to make all adjustments necessary to run off perfect copy from straight-line metal masters (from metal masters having an image that contains no halftones) on to $8\frac{1}{2}$ x 11 inch, 20 lb. paper stock.

In order to accomplish this objective the Duplicating Machine Operator Program is divided into two basic parts:

(1) The Audio-Visual Part.

The objective of this part is to enable the trainee to learn the name, appearance, location, and function of the major parts of the duplicator.

(2) The Practice Part.

The objectives of this part are to enable the trainee to: (a) Locate the parts on the actual duplicator; (b) Learn the structure of the duplicator and how the parts move when the machine is activated; (c) Learn the on and off position of the controls; (d) Make specific adjustments on the duplicator; and (e) Clean and leave the duplicator in a specified condition.

Program Content

The Audio Visual Part: (Learning the name, appearance, location, and function of the parts).

Section 1: Introduction to the 1250 Multilith Offset Duplicator

Section 2: The Water System

Section 3: The Ink System

Section 4: The Cylinders, Register Board, and Receiving Tray

Section 5: The Feeding End

The Practice Part:

Section 1: The Water System

Components

1. Locating the Parts
2. Attaching the Master to the Master Cylinder
3. Taking the Master off the Master Cylinder
4. Practice
5. Experimenting with the Parts (Machine in-operative)
6. Experimenting with the Parts (Machine operating)
7. Memorizing the on and off positions for the Parts
8. Filling the Water Fountain Bottle
9. Moistening the Rollers in the Water System
10. Removing excess moisture from the Molleton Cover of the Water Form Roller
11. Leaving the Machine in the Proper Condition

Section 2: The Ink and Water Systems

Components

1. Locating the Parts
2. Experimenting with the Parts (Machine in-operative)
3. Experimenting with the Parts (Machine operating)
4. Memorizing the on and off positions for the Parts
5. Filling the Water Fountain Bottle
6. Putting Ink in the Ink Fountain
7. Setting the Ink Adjusting Screws
8. Removing the Preservative Coating from the Master
9. Inking-up the Ink Rollers and moistening the Water Rollers
10. Inking-up the Master
11. Leaving the Machine in the Proper Condition

Section 3: Review of the Ink and Water Systems

Components

1. Repetition of Previous Adjustments

Section 4: Positioning the Copy from Side-to-Side

Components

1. Locating the Parts
2. Taking the Side Panel off the Duplicator
3. Finding the "High Point" and the "Low Point" of Movement of the Jogger Guide
4. Experimenting with the Approximate Adjustment of the Jogger Guide
5. Experimenting with the Micrometer Adjustment for the Jogger Guide
6. Experimenting with the Parallel Adjustment for the Jogger Guide

Section 4 (Cont):

7. Examining the Scale that is used when the Jogger Guide is Set into Position
8. Experimenting with the Operating Control Handle
9. Determining the Approximate Setting of the Jogger Guide
10. Determining the Approximate Position of the Jogger Guide with Sample Copy
11. Determining the Approximate Position of the Jogger Guide without Sample Copy
12. Setting the Jogger Guide in the Approximate Position
13. Repetition of Previous Adjustments
14. Inking-up the Master and Transferring an Impression to the Blanket
15. Checking and Setting the Parallel Adjustment of the Jogger Guide
16. Printing One Copy with the Handwheel
17. Checking the Side-to-Side Position of the Copy
18. How to Check the Side-to-Side Position of the Copy with the Sample Copy
19. How to Check the Side-to-Side Position of the Copy without a Sample Copy for Comparison
20. Repositioning the Jogger Guide
21. Printing Another Copy with the Handwheel and Rechecking the Side-to-Side Position of the Copy
22. Setting the Stationary Guide into Position
23. Positioning the Conveyor Tapes
24. Positioning the Paper Retainers

Section 5: Squaring Up the Copy and Positioning the Copy Vertically

Components

1. Locating the Parts
2. Repetition of Previous Adjustments
3. Experimenting with the Lateral Adjustment Knobs on the Lead and Trailing Clamps of the Master Cylinder
4. Checking to determine if the Copy is Printed Squarely on the Paper
5. Squaring up the Image on the Master
6. Locating the Parts
7. Experimenting with the Vertical Position Adjustment on the Master Cylinder
8. Checking the Vertical Position of the Copy
9. Adjusting the Vertical Position of the Copy
10. Checking to insure that the Lead Edge of the Master Cylinder is above the Lead Edge of the Blanket Cylinder

Section 6: The Receiving Tray

Components

1. Locating the Parts
2. Experimenting with the Top Pressure Adjustment

3. Repetition of Previous Adjustments
4. Checking Top Pressure
5. Setting the Correct Top Pressure
6. Locating the Parts
7. Adjusting Bottom Pressure
8. Checking Bottom Pressure
9. Readjusting and Rechecking Bottom Pressure

Section 8: Feed Rollers and Stop Fingers

Components

1. Locating the Parts
2. Checking Feed Roller Pressure
3. Balancing the Pressure Between the Upper and Lower Feed Rollers
4. Adjusting the Overall Pressure Between the the Upper and Lower Feed Rollers
5. Experimenting with the Adjustment of the Stop Fingers
6. Checking the Height of the Stop Fingers
7. Setting the Stop Fingers at the Proper Height

Section 9: The Feeding End

Components

1. Locating the Parts
2. Experimenting with the Parts
3. Setting the Jogger Side Magazine Guide in Position
4. Positioning the Paper Supports
5. Loading a ream of paper onto the Wooden Board
6. Positioning the Stationary Side Magazine Guide
7. Positioning the Stack Guides
8. Positioning the Paper Stop
9. Positioning the Sheet Separators
10. Positioning and Setting the Tension on the Upper Pullout Rollers
11. Positioning the Suction Feet
12. Checking the Clearance of the Parts on the Feeding End
13. Setting the Double Sheet Eliminator
14. Setting the Paper Height Bar
15. Positioning the Blower Tubes
16. Adjusting the Blow
17. Adjusting the Vacuum
18. Checking the Adjustment of the Feeding End

Section 10: Check Registration

Components

1. Repetition of Previous Adjustments
2. Setting the Skid Rolls into Position
3. Checking Registration
4. Loading the Paper Table
5. Running Make-Ready Stock
6. Symptoms of Malfunction

Section 10 (Cont):

7. Setting the Sheet Counter
8. Setting the Speed Control
9. Completing the Run

Section 11: The Final Operating Routine

Component

1. Repetition of Previous Adjustments

Program Administration

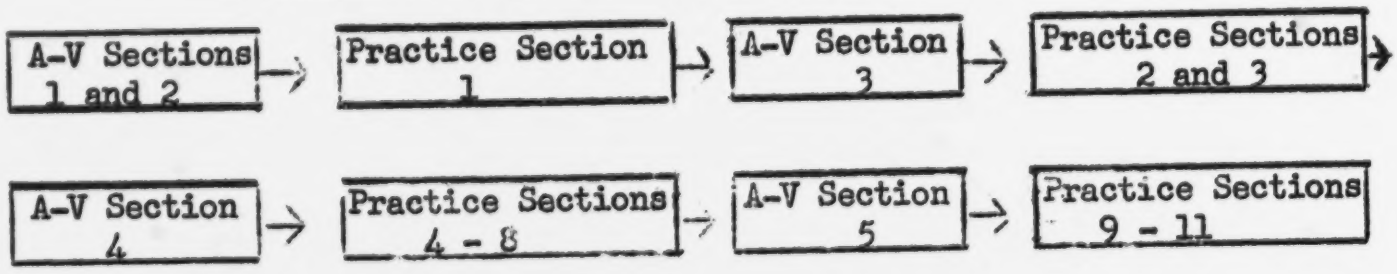
Table 1

Presentation Equipment and Material

	The Audio-Visual Part	The Practice Part
EQUIPMENT	Tape Recorder Slide Projector Projection Screen 6 Slide Trays 6 Tape Cartridges	3 Slide Trays Slide Projector Rear Projection Screen 1250 Multilith Offset Duplicator
MATERIALS	Question and Response Booklet Review Booklet Pencil	Printing Ink Repelex Solution Manual of Instruction Metal Masters Paper Stock (20 lb.) Ruler

Table 2

Recommended Sequence of Presentation


A-V Sections 1 and 2
Practice Section 1
A-V Section 3
Practice Sections 2 and 3
A-V Section 4
Practice Sections 4 - 8
A-V Section 5
Practice Sections 9 - 11

Training Time: 22 working days.

The actual administration of the Duplicating Machine Operator Program takes 12 working days. By the end of this period the trainee has learned the basics of operating the 1250 Multilith Offset Duplicator and has

practiced making a variety of individual adjustments on the machine by following instructions printed in the manual. The remaining 10 days are recommended to enable the trainee to take an imperfect finished copy; determine the reason(s) for the imperfection, and make the necessary adjustments to resolve the problem.

THE JANITOR PROGRAM

Objectives and Sub-Objectives

To enable the trainees to learn the elements of job performance for a beginning janitor, i.e., the learning of a janitorial work routine into which is integrated the use of equipment commonly used by experienced janitors.

In order to achieve this objective, the work of a janitor was divided into five areas of performance and the following sub-objectives were established for the program:

Stair Sweeping--To enable trainees to learn a technique of maintaining stairways
Dust Mopping--To enable trainees to learn a technique of dust mopping a floor containing miscellaneous pieces of furniture, e.g., an office.
Spray Waxing--To enable trainees to learn to maintain floors by the spray wax technique.
Lavatories--To enable trainees to learn a technique of maintaining a lavatory.
Stripping--To enable trainees to learn a technique of removing and replacing floor wax.

Program Content

Section 1: Introduction, Instructions, and Stair Sweeping

Components

A. Explanation of the Audio-Visual process
B. Summary of the course content
C. Instruction in the use of the presentation equipment
D. Instruction in how to study the course material

Stair Sweeping

A. Equipment Selection
B. Movement of the equipment to the work site
C. Practice
D. Return of the equipment to the storage site
E. Cleaning and storing the equipment

Practice Equipment Used by Trainees: Push broom, putty knife, hand brush, dust pan, waste collector.

Section 2: Dust Mopping

Components

A. Equipment selection
B. Movement of the equipment to the work site
C. Practice
D. Return of the equipment to the storage site
E. Cleaning and storing the equipment

Practice Equipment Used by Trainees: Dust mop, hand brush, dust pan, waste collector, putty knife.

Section 3: Spray Waxing

Components

A. Selection of the dust mopping equipment
B. Movement of the dust mopping equipment to the work site
C. Practice
D. Temporary storage of the dust mopping equipment
E. Selection and preparation of the spray waxing equipment
F. Movement of the spray waxing equipment to the work site
G. Practice
H. Return of the spray waxing equipment to the storage site
I. Practice
J. Return of the dust mopping equipment to the storage site
K. Cleaning and storing the dust mopping and spray waxing equipment

Practice Equipment Used by Trainees: Floor wax, mop bucket with wringer attachment, detergent, floor machine with buffing head, scrubbing head, and stripping pad, mop, putty knife, hand spray container.

Section 4: Lavatories

Components

A. Selection of the equipment
B. Movement of the equipment to the work site
C. Entering a lavatory: (1) Men's, and (2) Women's
D. Practice
E. Return of the equipment to the storage site
F. Cleaning and storing the equipment

Practice Equipment Used by Trainees: Toilet bowl brush, toilet bowl cleaner, mop, detergent, mop bucket with wringer attachment, cleanser, rags, sponge, pail, putty knife.

Section 5: Stripping

Components

A. Sketching the furniture locations
B. Removing the furniture

Section 5 (Cont):

C. Selection of the dust mopping equipment
D. Movement of the dust mopping equipment to the work site
E. Practice
F. Return of the dust mopping equipment to the storage site
G. Cleaning and storing the dust mopping equipment
H. Selection and preparation of the scrubbing equipment
I. Movement of the scrubbing equipment to the work site
J. Dividing the stripping area into scrubbing sections
K. Scrubbing the different sections
L. Preparation of the rinsing solution
M. Rinsing the scrubbed sections
N. Selection and preparation of the waxing equipment
O. Application of the first coat of wax
P. Buffing the first coat of wax
Q. Application of the second coat of wax
R. Buffing the second coat of wax
S. Returning the furniture with the aid of the sketch
T. Return of the equipment to the storage site
U. Cleaning and storing the equipment

Practice Equipment Used by Trainees: Dust mop, dust pan, waste collector, putty knife, mop bucket with wringer attachment, mop, detergent, floor machine with scrubbing head and stripping pad, wet or dry vacuum cleaner, wax, floor machine with buffing head.

Program Administration

Presentation Equipment:

1 Projection Screen
1 Slide Projector synchronized to 1 Tape Recorder (See detailed description of basic presentation equipment in the introduction to the Results Section).
15 Slide Trays
10 Tape Cartridges
17 Programmed Question and Response Booklets

Training Time:

(1) With practice after each section and using the programmed text booklets - 5 days.

(2) With practice after each section but without using the programmed question and response booklets (See Part C of Results) - 4 days.

(3) Without practice after each section and without using the programmed text booklets - 2 days (8 hours but should not be given in one 8 hour day).

Table 3

Integration

	Introduction, Instructions, Stair Sweeping	Dust Mopping	Spray Waxing	Lava-tory	Strip-ping
Number of Question and Response Booklets	2	2	2	4	7
Number of Tape Cartridges	1	1	2	2	4
Number of Slide Trays	2	1	2	4	6
Tape Time	30 min.	25 min.	40 min.	60 min.	106 min.

Part B. Characteristics of Clients Provided the Programs

Introduction

During the process of constructing the two programmed learning courses, a total of 48 of the MRC's client population were provided individual components of the courses, e.g., a client was given the instructions for placing his responses in the programmed question and response booklet.

This procedure was used to insure that the material being presented in the programs was appropriate for the kinds of trainees who would be receiving the course after it was completed.

Once one of the programs was developed, it was desirable to determine if the objectives of that program had been achieved, i.e., "Does the Janitor Program effectively train individuals to perform the work of a janitor?" In order to make this determination, another group of the MRC's client population were provided the completed program.

A total of 14 of the MRC 's clients were given the completed Duplicating Machine Operator Program. Of these, 9 were, or are, presently being provided all of the program and 5 clients were provided part of the program.

A total of 36 clients received the completed Janitor Program. Of these, 20 were provided all of the program and 16 were provided only part of the program.

The following material will document the characteristics of the clients who were provided the training programs.

(Note: The relatively large proportion of persons getting only part of the completed program could be expected in most non-educational settings such as the MRC. Some of the reasons why a person might get only part of the program are: (1) The person could be given part of the program for an evaluative rather than a training purpose, for example, to determine the person's capacity to learn. (2) The person may voluntarily terminate activity in the training program because he learned what is required to perform in the job and lost interest in continuing. (3) The person may voluntarily leave the training institution because of some reason unrelated to the training program, for example, a severe family crisis. (4) After the person is provided only part of the entire program it may be learned that his physical capacities are not sufficient to allow him to continue, for example, the person may not be able to do the lifting which is involved in the work of a janitor.)

1. AGE

The average age of the clients provided the Duplicating Machine Operator Program was 33 with a range of 19-55. The average age of the clients getting the Janitor Program was 34 with a range of 17-61.

This age range could be expected in using the programs in most non educational settings since employment in these occupations at less than age 17-18 is likely to be in conflict with state-federal child labor laws. On the other hand, the opportunity for securing employment on the basis of skill per se beyond age 55 is reduced because of employer resistance to putting someone on the payroll who is relatively close to retirement.

2. LEVEL OF EDUCATION

Table 4 shows the last grade of formal schooling completed by the clients.

Table 4

	Less than 8th Grade	8th to 11th Grade	12th Grade or More
Duplicating Mach. Oper. (N=14)	2	3	9
Janitor (N=36)	8	20	8

The average client in the Duplicating Machine Operator Program had completed 11.5 years of formal schooling. The range was 7-16 years. The average client in the Janitor Program, however, had completed 8.9 years of school. The range was 5-12. The finding of a higher level of education for persons receiving the Duplicating Machine Operator Program is not unexpected since the Program is teaching a "higher level" skill and one in which high school graduation is frequently an employment prerequisite.

3. READING LEVEL

The Gates Reading Survey was administered to nearly all clients in order to measure their level of reading comprehension. National surveys of reading skill place the average level of comprehension at the eighth grade.

The average grade level score for clients provided the Duplicating Machine Operator Program was 8.4 with a range of 6.5 to 11.9. The average reading comprehension grade level for clients receiving the Janitor Program was 5.7, ranging from the illiterate to 11.9.

Again, that the reading level is higher in the Duplicating Machine Operator Program than in the Janitor Program is expected because the ability to read well and understand what has been read is necessary in order to complete the program and function effectively in the work setting. This relatively high level of reading comprehension is not a prerequisite in the Janitor Program.

4. INTELLECTUAL FUNCTIONING

In order to determine the level of intellectual functioning of the clients, either the Army General Classification Test or the Wechsler Adult Intelligence Scale was administered. The test scores were then converted to equivalent percentile scores. Table 5 presents the clients' level of intellectual functioning in comparison to the general population.

Table 5

Level of Intellectual Functioning

Percentile Rank	Duplicating Mach. Oper. (N=14)	Janitor (N=36)
Less than the 24th	2	20
25th to the 49th %ile	3	9
50th to the 74th %ile	4	3
75th %ile or More	2	1
Not Tested	3	3

5. PRIMARY DISABILITY

The primary disability of the clients at the time they entered the MRC program is presented in broad categorization in Table 6 below.

Table 6

Primary Disability

Category	Duplicating Mach. Oper.	Janitor
Mentally Ill	4	12
Mentally Retarded	0	8
Physically Disabled	7	12
Disadvantaged (ghetto resident school dropout, etc.)	3	4

The proportion of clients in each of these categories could be expected to vary substantially, depending on the particular kind of non-educational setting in which the training is offered. For example, the proportion of persons in the "Disadvantaged" category would be greater than that encountered in this project if the training is offered in a neighborhood settlement house. By the same token, offering the training in a state hospital would find a larger proportion of "Mentally Ill" persons receiving the course.

In general, all of the persons tested were unemployed because of one or more of the following reasons:

(1) The person did not have a job goal or his goal was not appropriate.

(2) The person did not possess adequate job-seeking behaviors, e.g., he did not look for work with sufficient frequency or he could not explain his skills to an employer, etc.

(3) The person did not possess adequate job-retention behaviors, e.g., he could not keep a job because of excessive absenteeism or tardiness from work, an inability to get along with supervisors, or lack of a marketable skill, etc.

With this understanding of some of the basic reasons why the clients were not working, the reader should realize the variety of factors, other than skill per se, which influence whether or not a person will become satisfactorily employed following his training.

6. PREVIOUS JOB EXPERIENCE

Twelve of the fourteen clients provided the Duplicating Machine Operator Program had engaged in gainful employment at some time prior to coming to the MRC. None of these clients had had job experience which was related to operating a duplicating machine. Thirty-one of the thirty-six clients provided the Janitor Program had had previous job experience before entering MRC. Ten of those clients had had janitor related work experience.

7. OUTCOME OF TRAINING

The method which is most commonly used to evaluate the effectiveness of a vocational training program offered in an educational setting is the proportion of trainees who obtain a training-related job after they complete the training program. Because of the small number of clients involved in the two training programs, little statistical analysis could be undertaken. Since even expressing outcome in terms of percentages achieving a given outcome is misleading for the same reason, the actual number achieving a given outcome is presented.

The Duplicating Machine Operator Program: As noted earlier, 14 persons were or are presently being provided all or some part of the program. Two of these are presently receiving the program and one could not be located after completing the program. Thus, the total number of clients included for this outcome analysis is reduced to 11.

Six were provided all of the program and five were given some--but not all--parts of the program. Three of the six clients provided all of the program, and two of the five who received some parts of the program obtained training-related employment.

Thus, five of the eleven clients who were given the Duplicating Machine Operator Program later obtained a job which was related to the training program.

The Janitor Program: A total of 36 clients were provided the completed Janitor Program. Of this number, 20 were provided the entire program and 16 received some parts of the program. Thirteen of the twenty who got all of the program, and three of the sixteen who got part of the program later obtained training-related employment.

Thus, 16 of the 36 clients who were given the Janitor Program obtained a job which was related to their training program.

Approximately the same proportion of trainees obtaining training-related employment upon completion of their training could be expected in non educational settings which are similar to the MRC with the kinds of persons served, e.g., persons with substantial social, vocational, medical, and psychological problems. The reason is that, particularly at the unskilled and semi-skilled level of jobs, skill is only one factor which determines whether or not the person will get a training-related job. Other factors which can have as much influence are: appearance and grooming; previous job history (references from previous employers); ability to explain job skills; ability to explain problems (previous institutionalization for mental illness or illegal activity, etc.); and the "pool" of persons available in the labor market in the particular community. If there is considerable unemployment, then there is more competition for the jobs which are available and employers are in a position to choose whom they wish to employ from a variety of applicants. When there is little unemployment in the community, there are fewer applicants available for the employer to choose from. Consequently, persons who have substantial employemnt handicaps have a greater likelihood of obtaining training-related employment in periods of low unemployment.

Part C. Qualitative Comments and Analysis of the Training Programs

Introduction

In order to evaluate the effectiveness of the training programs, it would have been desirable to systematically contact the employers and supervisors of those clients who had been provided the programs. These employers and supervisors could have provided us with their findings as to how well the programs trained the clients to perform in the work setting. Unfortunately, it was not usually possible to contact a client's employer. The reason is that at the MRC the Vocational Counselor tries to teach the client to secure his own job--without the intervention of the counselor with the employer. It has been found that this procedure enables the client to both achieve the satisfaction of knowing that <u>he</u> got his job, and prepares him to handle independently his own job search should he want to secure a different job in the future. In addition it is left

up to the client to decide whether or not he will tell the employer he has been at the MRC. We have found that many of the MRC's clients have been turned away from jobs once the employer learns the client was in a rehabilitation setting. As a result many of the clients secure their jobs without the employer's knowing that they have received services at the MRC. It would have put the client's job in jeopardy had these employers been contacted by representatives of the MRC.

For this reason, the evaluation of the effectiveness of the training programs has been accomplished by securing information from: (1) Those employers and supervisors who could be contacted, (2) The MRC's Industrial Education Specialists whose job is to evaluate the work skills of their clients, and (3) The MRC's Vocational Counselors. The judgments of these individuals concerning various aspects of the two training programs is presented in the following sections.

THE DUPLICATING MACHINE OPERATOR PROGRAM

Client Selection Criteria

The potential trainee should:

1. Be able to read and understand written instructions.
2. Have complete use of both hands.
3. Have the capacity to stand for at least four hours.
4. Have reasonably good vision (demonstrated by the capacity to read a ruler graduated in 1/8 inches.
5. Have no color discrimination problem (we used the Dvorine Color Discrimination Test).
6. Have average mechanical comprehension (we used the Bennett Mechanical Comprehension Test).
7. Have fine finger dexterity (demonstrated by capacity to grasp a small nail or pencil.
8. Have a degree of patience for what is rather exacting work.

It is obvious that whether or not a potential trainee meets some of these selection criteria cannot be objectively measured. They are all, however, factors which should at least be considered before providing the program.

Predicting Successful Completion Once the Trainee Begins

If the recommended sequence of presentation shown earlier in Table 2 is used, the trainee should probably not be continued in the training program if he has not learned the material (with one or two repeats) prior to completing Practice Section 4. Using this point is suggested since the material being presented becomes increasingly more complex after that Practice Section.

Instructor or Supervisor Time Necessary

This obviously varies with individual trainees, but an instructor spends approximately 6-8 hours in small periods of not more than one-half hour in the first 12 day portion. About the same amount of time is necessary if the client remains in the training program for the recommended second

ten days. The Center has found that, using the program, instructor time input is reduced by two-thirds over the instructor time necessary when the program is not used.

Use of the Training Program as an Evaluation Technique

Using this program as an evaluative technique, e.g., to determine capacity to learn, etc. is not recommended because of the amount of instructor or supervisor time which is structured in the program.

Points of Difficulty in the Training Program

The only problems mentioned by those contacted were: (1) The tendency on the part of the trainees to want to ask questions of the instructor or supervisor rather than independently look in the manual when confronted with a problem. This problem typically arose after the trainees had completed the Audio-Visual Sections in which there is little independent activity required. Once this dependent behavior was discouraged, the trainees were able to learn by reading the manual. (2) Although the trainees were able to make individual adjustments in the duplicator as they progressed through the course, most had difficulty in working backward from an imperfectly produced copy to make the necessary group of corrective adjustments. It is for this reason that the recommendation is made that the trainees receive the second 10 days of practice and instruction. When this additional time is provided, the trainees have been found to be capable of independently operating the duplicating machine.

Possible Variations in Presentation

1. Provide no Audio-Visual Sections - This is not recommended as the clients do not get the overall picture of what is to happen in the program. If this procedure is used the background of experiences which is to be built on by the program is greatly reduced.

2. The potential trainee can observe another trainee who has completed several sections of the program. This procedure is recommended whenever feasible, as it tends to supplement the Audio-Visual Sections in teaching the trainee what is involved in the program.

3. Where feasible, one trainee who has completed two weeks of the program can help a new trainee. This procedure has been found to be mutually rewarding to both trainees. The advanced trainee feels himself an expert and, consequently, insures that he has learned the material. The new trainees appear to be more comfortable at first with another trainee than with an instructor or supervisor. This procedure also confirms for the new trainee that the material can be learned.

Other Duplicating Equipment the Trainees can Operate After Completing the Program

With approximately one hour of supplemental instruction, the trainees are capable of operating: a 1250 Multilith Offset Duplicator; an A. B. Dick Offset Duplicator; a Chief Offset Duplicator; and most models of office duplicators.

Possible Job Progression Following the Program

Several sequences of progression are possible after some work experience has been obtained. Examples are:

1. From the Multilith to other types of offset duplicators
2. From the Multilith to Plate Making to Web Fed and Multi-Color Presses.

General Comments

1. There is the possibility that some women may need reinforcement to continue in the program since there is a tendency for beginning trainees to get dirty operating the machine until they learn the correct procedures of operation.

2. Those employers and supervisors contacted found that little additional instruction is necessary for the employee who has completed the 22 day training sequence.

3. Although it was not verified by testing, several individuals contacted mentioned that although a degree of mechanical comprehension is necessary, persons with clerical aptitude and background experience tended to learn the program more quickly than did those with a more mechanically-oriented background.

4. The clients who completed the training course usually expressed much more confidence in themselves when their training was finished than when they began the program.

THE JANITOR PROGRAM

Client Selection Criteria

The potential trainee should:

1. Have no substantial visual or hearing problems.
2. Have the physical capacity to stand for four hours and to lift up to 50 pounds.
3. Have the capacity to follow verbally presented instructions.
4. Have some degree of judgment (be able to look at a floor which has just been swept and decide whether it is clean or not.)

Although not all are subject to objective measurement, these factors should at least be considered before providing the program to a trainee.

Predicting Successful Completion Once the Trainee Begins

If there are still errors after Sections 1 and 2 (Stair Sweeping and Dust Mopping) have been repeated, it is doubtful if the trainee has the capacity to complete the program.

Instructor or Supervisor Time Necessary

Although this obviously varies with the capabilities of the individual trainee, approximately 2 hours is necessary for administering the

programmed portions of the course, e.g., changing the tape cartridges. If the trainees practice after the presentation of each section in the program, instructor or supervisor time is approximately 8 hours, spread over five days. This is an instructor time input reduction of 50% over the time input when traditional training techniques are used.

Points of Difficulty for Clients in the Training Program

In the Stair Sweeping Section, trainees are instructed to sweep half of a staircase at a time. Unless they are told that they will be tested on the material, many trainees have difficulty learning this concept without repeating the presentation of the material.

Use of the Programmed Question and Response Booklets

Use of these booklets has not been found to contribute significantly to the program. Those who are able to read the booklets are able to learn the necessary material from the slides, taped material, and practice. Those who are very poor readers or non-readers cannot use the booklets to any advantage and are also capable of learning the material on the basis of the slides, taped material, and practice. In some instances, poor readers or non-readers require a section to be repeated, but this takes no more time than does using the question and response booklets.

When the Trainee Should Practice

It is recommended that the trainee practice after each section has been completed. This has two advantages: (1) The instructor or supervisor can determine if the trainee is learning the material or is having difficulty with a particular procedure, and (2) The trainee tends to pay more attention to the programmed material when he knows that his performance will be monitored.

General Comments

1. The employers and supervisors of trainees related that the trainees needed little supplemental instruction, short of teaching the variations in routine used in the particular firm.

2. Both employers and the MRC's Vocational Counselors pointed up the need to combine the presentation of the program with supportive services to deal with such problems as grooming and personal appearance, tardiness, etc.

3. The MRC's Industrial Educators reported that trainees who had had some previous janitorial related experiences frequently noted that they learned new information in the program.

DISCUSSION,

CONCLUSIONS,

IMPLICATIONS

This section will discuss the techniques used and the results obtained in the two job training programs which were developed in the project; will elaborate on the strengths and weaknesses of the techniques; and will discuss the considerations in using the techniques in developing other job training programs.

The Techniques Used and Results

What are the techniques?

The techniques used in the two training programs could be described, strictly speaking, as an approximation of programmed learning in its purest form. The programmed learning technique involves providing a small bit of information to the trainee, the immediate generation of a response by the trainee, and the immediate confirmation of that response. This technique could be contrasted with traditional classroom technique wherein large amounts of information are provided to the student and a response may not be generated by the student until some later time, e.g., on a test; and the reinforcement of that response may be delayed still longer, e.g., until the test results are returned to the student.

The Audio-Visual part of the Duplicating Machine Operator Program and the presentation of the programmed material in the Janitor Program when the question and response booklets are used, utilizes the programmed learning technique in its purest form. However, the Practice portion of both programs is only an approximation since the confirmation of the trainee's responses are made by the instructor, are not immediate, and are not controlled.

Are the techniques efficient and effective in a non-educational setting?

Because the completed programs have been found to reduce the total amount of supervisory or instructor time necessary to train an individual for the occupations, and because the programs tend to maximize the use of that instructor or supervisor time which is needed, we have concluded that the techniques are more efficient than the training techniques typically utilized in non-educational settings.

As discussed in the Results Section, it was not possible to systematically contact the employer or work supervisor of every client who received the two training programs. This would have been the most desirable method of determining the effectiveness of the techniques used in the training programs. However, on the basis of the comments of those employers who could be contacted and the MRC's Vocational Counselor, and the expert opinions of the MRC's Industrial Education Specialists whose job is to evaluate the work skills of their clients, we conclude that the techniques used in the two training programs are effective and can be used in similar non-education settings.

Strengths of the Techniques

Our conclusions as to the strengths of the techniques are:

1. The programmed presentation of information insures that all trainees consistently receive the same thorough input of information. One of

the common problems encountered when an instructor presents all the information in a training course is that the instructor tends to forget to present certain crucial information.

2. The trainee learns and progresses in the program at his own pace and does not move to the next step until he has mastered the information in the preceding step.

3. Because the trainee is instructed in the programs to seek out his supervisor or instructor at specified times, the use of the instructor's time is maximized.

4. The programs meticulously explain to the trainee the precise behaviors which he is expected to produce. Supervisors and instructors like the programs because, in the course of training a number of individuals, it is this repetition of basic background details which tends to become boring for instructors.

5. Because the use of a programmed learning technique involves providing immediate reinforcement, the acquisition of knowledge by trainees is rewarded.

6. Once developed and reproduced, the programs are relatively low in cost to administer to trainees.

Weaknesses in the Techniques

Our conclusions as to the weaknesses of the techniques are:

1. It is time consuming and difficult to integrate the content of the programs into the presentation system. It is quite time consuming to take the hundreds of color slides which are necessary in the programs; to synchronize the slides to the tape recordings; and to solve the myriad of problems which arise such as deciding how fast to speak into the tape recorder; how long to show a slide, etc.

2. The cost to reproduce the training programs is relatively high. For example, in reproducing the tape recorded material, each tape must have the metal foils to stop the machine placed in the tape track by hand. The same is true of the signals which are used to synchronize the changing of the slides to the taped material.

3. Rigidity of material. Each trainee must go through the same material in the same sequence. There is no provision for short-cutting the process for a trainee who does not need the information in the detail presented.

Developing Other Job Training Programs Using This Technique

Our conclusion is that this approximation of the programmed learning technique can be effectively used in developing other job training programs.

Although elements of most jobs could be programmed using this technique, there are important considerations which should go into selecting what

jobs, or what elements of those jobs, should be programmed. These considerations basically involve the level of difficulty of programming the job, and the economics of producing a training program for that job.

Some of the factors which influence the level of difficulty and the economic feasibility of developing a job training program using the techniques used in this project are:

1. Whether or not the job performance requirements are similar from one work setting to another. If there is tremendous variability in the work from one setting to another, the programming of the job will be quite difficult. This sort of variability was found as we developed the Janitor Program. The variability would also be present, for example, in the job of Hospital Orderly.

   As was found in the work of a janitor, it is possible that there may be a common core of tasks which are performed--regardless of work setting. Developing a training program might then be feasible to teach this core of tasks.

2. The extent to which there is a commonality of job elements within one setting. Even though there is great variability in the job performance requirements from one firm to another, one firm may have a sufficiently large number of individuals performing the same tasks to make the development of a training program feasible. This might be the case, for example, in a large firm which employs many janitors, and which contracts with other companies to perform janitorial services.

3. Whether or not the activities in the performance of the job take place within a circumscribed physical area. The level of difficulty in programming a job is increased when, in order to perform the job, the individual must move about from one area of a building to another. This point can be seen clearly in contrasting the work of a duplicating machine operator with that of a janitor. In developing a training program for a job which is not performed in a circumscribed area, those elements of the job which are performed within the confines of a particular area can be broken out and separately programmed, e.g., dust mopping an office and sweeping a staircase in the Janitor Program.

4. Whether or not learning to perform the job is more efficiently accomplished in the job setting itself. Punch Press Operators, for example, were found to be able to learn the job in a very short time in the work setting. Consequently, the expense of developing a programmed training course for this occupation could not be justified. A mitigating factor might be the number of persons in a particular firm who must be trained. A firm which employed several hundred punch press operators might find it economically feasible to use a programmed training course.

5. The possibility of a change in technology which might make the training program obsolete before it had paid for itself.

The complexity of decisions required is directly related to the difficulty in programming. The fewer choices of action at decision points in the job the easier it is to program.

SUMMARY

The Objective of the Project

The objective of this project was to construct automated audio-visual vocational training courses for a population of poor learners. This population was defined to include delinquents, the culturally deprived, the intellectually limited, the physically disabled, and those described as the "hard core unemployed".

These job training programs were to be designed for use in non educational settings such as rehabilitation centers, state hospitals, etc. where the staffing capability is present to concurrently provide such services as counseling and casework and where instruction typically must be provided on an individual rather than a class basis.

What was Produced in the Project

In the course of the project, two vocational training programs were developed: (1) The Duplicating Machine Operator Program, and (2) The Janitor Program.

The Duplicating Machine Operator Program:

The objective of the Duplicating Machine Operator Program was to enable an individual who was completely unfamiliar with the duplicator to make all adjustments necessary to run off perfect copy from straight-line metal masters on to 8½ x 11 inch, 20 lb. paper stock. The project found that, using the training program, a poor learner can be taught to operate effectively a duplicating machine in a period of 20 working days with a substantial saving of instructor time input when compared to the time input necessary when traditional training techniques are used.

The Janitor Program:

The objective of the Janitor Program was to enable an individual to learn a janitorial work routine into which was integrated the use of certain equipment commonly used by experienced janitors. The project found tht, depending on how the program is presented to the trainee, a poor learner can be taught to perform effectively as a beginning janitor in from 2 to 5 working days with a relatively small amount of instructor time necessary.

How the Programs Were Developed

The development of the programs proceeded in the following sequence: (1) A survey was made of pertinent literature in the field of programmed learning of occupations; (2) Visits were made to business and industrial concerns to learn what the trainees would be expected to be able to do in the work setting; (3) The personnel developing the training programs learned how to do the work involved in the jobs; (4) The content material in the programs was prepared, tried out, and revised; (5) A presentation system was selected; (6) The content material was integrated into the presentation system; and (7) Trainees were provided the completed programs and their performance was monitored.